

CP HORTICULTURALIST SOCIETY MEETING

NOV. 4TH

Subject: House/Indoor Plants

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GARDEN ELEMENTS



Soil Composition



Watering + Light



General Indoor Plant Care Knowledge

Soil Composition

Perlite vs. Vermiculite vs. Potting soil



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Aeration vs. Water Retention

Compression of soil = DEATH

Balancing water retention, aeration and porosity of the soil

Main causes of DEATH in indoor plants…

→ Lack of OXYGEN available

→ Overwatering

MEDIUM	Water Retention	Aeration (Oxygen)	Nutrient Retention (CEC)
Perlite	LOW	VERY HIGH	INERT/NONE
Vermiculite	VERY HIGH	MODERATE	MODERATE
Potting Soil	HIGH	LOW	HIGH

Common indoor plant + what they like!

Succulents, Cacti, Monsteras, Philodendrons, Pothos, Snake Plants, Fiddle Leaf Fig

- Dryer conditions
- High-oxygen environments
- Thick, fleshy roots

(Susceptible to root rot and anaerobic respiration)

Perlite + Potting Soil!

Ferns, Calatheas, Peace Lilies (Mesophytes)

- Moisture-loving plants (tropicals)
- Highly damp/moist environments
- Lacking in water storing tissue

(A little perlite just for good measure)

Vermiculite + Potting Soil!

Spider plants, Chinese Evergreen, ZZ plants

- Dense root systems
- Requires a middle ground (dry + wet conditions)

Vermiculite, perlite and potting soil!

SEDUM!

- OXYGEN LOVERS
- Need large amounts of perlite and NO VERMICULITE
- Have delicate and shallow root systems (require maximum macropores)









PLANT PHOTOS

(My credentials)



Watering and Light



Turgidity of Plants (Turgor Pressure)

(Pressure exerted by the cell's fluid content against the cell wall) = Swollen

Phototropism + Gravitropism

- Master growth hormone: Auxin

- Battling of these processes

Bottom-watering vs. Top-watering

Root location + Porosity of soil

Energy Budget/ Resource Partitioning

- Prioritization of growth in roots vs. vegetation

"it's not the amount of water you give your plants it's the frequency" – Hannah Pentz

General Indoor Plant care

PHYSICAL APPEARANCE:

Internode density + Definition of leaves

Wipe down your plant leaves → **PHOTOSYNTHESIS**

PHOTOPERIODISM! (Summer vs. Winter)

→ Change in daily light cycles

Repotting (size, when do you?)

→ Drainage or Liners

NO ROOTS = NO WATER

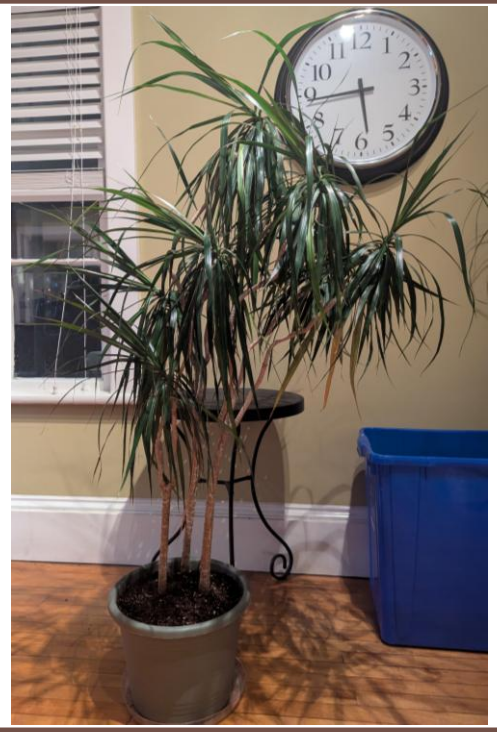
→ Propagation or Planting

Flowering of indoor plants

→ Good or Bad?

Did you know that plant damage can be Beneficial!











THANK YOU!

If you have any further questions, please reach out :)

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Special Acknowledgement: Hannah Olivia Pentz,

SLIDE 3: SOIL COMPOSITION

Perlite (Volcanic glass – heated till is pops, creating trapped air bubbles):

Hydrophobic and used for soil aeration (creates macropores), counteracts compaction of soil (creates gaps/macropores in between the potting soil to allow for oxygen uptake (for cellular respiration) and the formation of water pockets throughout the soil) → ideal for dryer climate plants,

Vermiculite (Silicate mineral that expands into layers when heated

Hydrophilic (they take up water/store water) allows for better water retention (as its layered structures act like a sponge) in soil especially during stressed times, aeration of soil (oxygen uptake) but only when in dry conditions, as it is soft and malleable compaction of soil can occur over time, attracts nutrient uptake (magnesium, potassium etc.)

Potting soil: Bulk of soil composition in pots, acts as a growth medium for roots to easily grow in multiple directions, has a general baseline of nutrients available for plant uptake, allows for drainage of excess water, allows for minimal aeration between soil particles, holds onto nutrient ions very well and has massive water holding capacity.

→ The pore spaces can fill entirely with water, cutting off oxygen and forcing the roots into anaerobic respiration which causes root rot.

Roots need oxygen to survive as oxygen is needed for cellular respiration to generate ATP (energy) to actively absorb nutrients.

- If there is no oxygen available for the plants roots to take up then the root can actually go through root rot!
- If your plant is sitting (swimming/drowning) in water, not only are your plant roots devoid of access to oxygen, but they are also sitting in excess water that cannot be taken up by the soil/plant, which means over time the roots are unable to preform aerobic respiration (use oxygen to produce ATP – used to pump nutrients and water through the plant body) and instead the roots must complete anaerobic respiration (which produces a fraction of the ATP, it also creates harmful byproducts like ethanol and lactic acid), which will actually cause root rot in your indoor plants (poisoning them from the inside out).
- The plant then undergoes APOPTOSIS (programmed cell death) of the roots

→ Plant is sitting in water but DEHYDRATES as the PCD of the roots causes thh plant to lose its machinery to absorb water into the plant

SLIDE 4: COMMON INDOOR PLANTS AND WHAT THEY LIKE!

When you want your soil to dry faster → PERLITE

When you want your soil to stay evenly moist → VERMICULITE

Try to match your soil composition/mineral to the plant's native ecology!

Mesophytes – plants that grow in environments with moderate moisture, they LACK water storing tissue as in their natural environment they do not experience extreme drougths

SLIDE 6: WATERING AND LIGHT

Correct watering of your indoor plants is crucial for survival, but there are a few tricks you can do instead of simply watering without knowing if your plant is thirsty!

1. You can check if your plant needs water by touching it! → if you squish the leaves of your plants with your fingers, are they limp/ malleable or stiff/turgid

- LEAF SCENESCENCE (programmed nutrient recycling) → recycling of old leaves to feed the growth of new leaves
- WARNING: there is a small group of exceptions to this rule – Plants that have thick, leathery, woody, or "carboard – like" leaves (Fiddle leaf fig/ZZ plants) have heavily reinforced cell walls, so their leaves will stay perfectly stiff and upright even when they are bone dry.

2. Check to see if there is still water present underneath the liner!

3. Has the soil contracted away from the edges of the plastic pot liner?

4. Do the wooden chopstick test/finger test! → test to see if it is wet to the bottom of the pot

→ WATER ALWAYS FLOWS TO THE AREA OF GREATER SOLUTES

Hypertonic Conditions:

- Concentrations of solutes outside the cell is greater than what is inside the cell

- Water is pulled out of the cell/ net movement of water is outside of the cell (causes cell shrink/become limp/ plasmolyzed)

Isotonic Conditions:

- Equal concentrations of solutes inside and outside the cell
- Water is not pulled out of the cell/ net movement of water is 0 (cell is flaccid)

Hypotonic Conditions:

- Concentrations of water are greater inside the cell than outside of the cell
- Water is pulled inside the cell/ net movement of water is into the cell (causes cells to become turgid/ swollen)

Types of Plant Watering

- As indoor plants reside in a pot with drainage/ a pot with a liner inside, there are a few ways that you can water your plants...

1. Top watering (most known way – pouring water onto the top of the plant pot and allowing it to soak down into the soil)
2. Bottom watering (less common way – taking either the drainable pot or the pot liner and standing it in a body of water so that the soil can slowly pull water upwards into pot form below)

→ While top-watering is the most common and will water your plants, bottom watering is actually a more effective method of watering your plants, for a few reasons...

- As the location of the roots inside a plant pot is very close to the bottom/growing in that direction, you can give the roots water more directly by watering the pots from the bottom up (closer to the location of the roots relative to the rest of the plant)
- As well, when you top-water a plant you are consistently compressing the soil inside the pot. Each time that water is poured onto the top of the plant to flow downwards towards the roots, you are compressing the soil composition tighter and tighter to the point where any water pockets (macropores) are virtually non-existent, creating oxygen availability problems for the plant roots

Phototropism + Gravitropism

- Plants experience Phototropism, which means their leaves and stems grow in the direction of sunlight, this can cause them to become lopsided and created uneven balance

of your plant (just bad in general for plants to live in uneven conditions) → PHOTOTROPISM: Directional growth of a plant in response to a light stimulus

- Plants also experience gravitropism, which means their roots grow in the direction of gravity, this is actively important for growing root structures, not only to allow for strong anchoring of your plant but also to facilitate enough room for root growth! → GRAVITROPISM: Directional growth of a plant in response to the stimulus of gravity

→ There are times where these processes can actually clash with one another and cause hormonal miscommunications in your plants reducing the growth and fitness of your plants!

- Growth hormone known as auxin is responsible for both the effects of gravitropism and phototropism in plants (G → auxin pool to bottom side of the drooping stem to force it to bend back upward against gravity) while (P → auxin flees to the shaded part of the stem as it hates sunlight causing it to bend further towards the light source)
- The hyperaccumulation of auxin in the same tissues causes the production of ethylene (hormone which stunts cell elongations and halts stem growth)

(drooping of stems cause diminished growth)

Plants will actually prioritize growth in different areas based on the availability of resources that they are being given

- So when plants are dry (lacking water) they will actually prioritize root growth over stem/leaf growth in hopes that aggressive root growth downwards will lead to hidden pockets of water, but this can be a good indication for more water needed in your plants or indicates that you need to upgrade your pot size!

SLIDE 7: GENERAL INDOOR PLANT CARE

Internode density

- Closer nodes together means more petioles and leaf production between each inter node distance on a plant, the more nodes = the more nutrients/water/greater fitness of your plant

Definition of leaves

- When plants are at a high fitness (they are receiving ample nutrients, water etc.), they have more energy that they can expend on leaf definition allowing for more complex and defined leaf boundaries to be produced, versus at times of stress very rudimentary/simple leaf shapes are visible

Wiping down leaves

- Leaves are covered in stomata (pores used for gas exchange) and chloroplasts (absorbs sunlight)
- Dust reflects light and blocks these pores, preventing efficient photosynthesis and stomatal gas exchange

Photoperiodism

- Plant experience photoperiodism: plants can track the changes in daily light cycles and can adjust to them to determine growth, blooming and dormancy (not same needs during winter as summer)
- During the summer obviously your plants get a lot more sunlight, therefore watering increases, turning of plants etc.
- But during the winter (change of period) plants are not growing under the same conditions, they DO NOT need excess water, etc. as they are receiving less sunlight etc.
- In winter there are extended nights which the plant can sense and they go into survival mode where growth is slowed

Repotting:

- Tricks for filling pots when you do not have the same size, rocks, cutting liners etc.

- VERY NECESSARY – if your indoor pots do not have drainage, they MUST HAVE A LINER! → Main cause of plant death (sitting in water consistently)

DO NOT WATER IF NO ROOTS YET!

- → Must determine if propagation or pot planting is necessary
- → If your plant has no roots it cannot take up water into the plant instead you completely block oxygen and allow your plant to sit in water and slowly rot
- → Must allow for roots growth in water (only) or substrate (soil) and then once roots have emerged, they can be transitioned into pots with soil, and water can be given
- Flowering in plants (doing too well – they will try to flower and reproduce)

- INDOOR plant don't need to flower to continue to survive and reproduce like outdoor plants do, in summer the wind carries the seeds away from the mother plant in hopes of allows for further growth in other areas, but for house plants this process is redundant and what happens instead is your plant uses tons of energy and resources to produce flower structures, but doesn't reap any of the benefits of it, so for indoor plants you can let them flower OR you can actually manually remove the flowers so that your plant can go back to prioritizing plant growth!

- Plant damage being beneficial?

→ Broken plants can actually stimulate growth, regrowth of sedum leaves by piercing internodes